**Unit Title: Grade 9 – Linear Relationships and Modeling**

**Organizing Concept:** Functions: Interpreting

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| **Questions to Assess Prior Knowledge:**   1. Graph the following points: (provide several coordinates in all four quadrants) 2. Which of the following is a linear function? (Provide several graphs including quadratics, etc.) 3. Which of the following might be a data point of this linear function? (provide a graph and set of coordinates) 4. Which line has a slope of ½? (provide graphs) [could have them draw a line with a slope of \_\_] 5. What is the y-axis intercept of the following graph? Of the following equation? (set up in y=mx+b) 6. Describe (and sketch) how you would determined the unit values along the x- and y-axis for a graph with x-values ranging from 12-285 and y-values ranging from 2-6. 7. Find the missing numbers in this table and explain the pattern or rule: (provide a table of a linear equation with a few missing y-values) 8. The slope-intercept form of a linear equation is y=mx+b and the standard form of a linear equation is ax+by=c. What do each of these variables represent? |
| **Questions to Draw-out Misconceptions:**   1. Signs and parenthesis: -x2 ≠ -(x2) 2. Choosing appropriate integers to complete tables (e.g. y=x+2 – they rarely use negative values for x) 3. Inappropriate scale on the x- and y-axis   Assignment of domain and range to a graph or table |
| **DOK 1:**   1. Find f(5) when f(x) = 3x-7 2. If a = 4 when b=12, find a when b = 15 3. Graph the following equation y = 2x + 4 (DOK 2??) 4. Determine the slope of a line of given two coordinates / points. 5. Determine the slope of a line from the following data table. 6. How does domain and range define a linear equation? 7. Define dependent and independent variables. 8. Along which axis do you graph a dependent variable? An independent variable? 9. Find f(5) when f(x) = 3x-7 10. If a = 4 when b=12, find a when b = 15 11. Graph the following equation y = 2x + 4 (DOK 2??) 12. Determine the slope of a line of given two coordinates / points. 13. Determine the slope of a line from the following data table. 14. How does domain and range define a linear equation? 15. Define dependent and independent variables. 16. Along which axis do you graph a dependent variable? An independent variable? |
| **DOK 2:**   1. Graph the following equation -2x+y=4 2. Write the equation for the line. (provide a graph with an obvious y-intercept (integer) and a simple slope) |
| **DOK 3:**   1. Write the equation for the line. (provide a graph with points that result in a y-intercept that is not an integer). 2. Given a set of real-world data (e.g. population in a town for the past 5 years), predict the population of the town in 10 years. 3. Give an example of a real-life study that would result in a linear equation: x and y vary directly or indirectly. Give an example of a real-life study that would result in a non-linear equation: curves. 4. When might time be a dependent variable? And explain why time is dependent on the other variable. |
| **DOK:4**   1. [Teachers] choose a quantitative survey topic and have students complete a survey that would result in a linear equation (e.g. height and shoe size, attendance or homework or screen time and grades). Have students predict y for x outside of the data range. Find a sample x and check your prediction for y. Write an explanation of your x-and y-intercepts, interpret your data line / correlation, and write about why your prediction matched or did not match your data. Predict how your data might change if you did this same study with early elementary or post-college samples. 2. How can x- and y-axis scales on a graph be used to bias interpretation of data? [show examples of graphs that misrepresent the data trends and patterns] |
| **Literacy – Writing to Learn:**   1. For any prediction write a paragraph defending your answer referencing your data and model. 2. Use admit and exit tickets to target misconceptions and necessary re-teaching or mini-lessons. 3. Use small dry-erase boards to have students create equations, complete tables, draw graphs or write explanations of linear functions and hold them up for visual checks and discussion of variations. 4. Take writing breaks during teaching / focus lessons to have students write what they are learning, seeing, hearing, or questioning. For example, as you introduce the components of a graph, have students take a 2 minute break and create a graph in their notes labeling each of the parts and explain why the parts are important for understanding and interpreting the data correctly. 5. Brainstorm places we see and use graphs and tables in our lives? 6. Journal about how graphs help us visualize data patterns, make predictions, or interpret and evaluate data more quickly than using a description, equation, or data tables.   Use vocabulary to create a word wall or use vocabulary to play games (crosswords, bingo, etc.) |